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Patho-morphological Changes in Kidneys of Slaughtered Sheep and Goats in Jammu Region

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ABSTRACT

The study was conducted in government recognized and unorganised slaughter houses of sheep and goats in Jammu from the month of July 2013 to June 2014. In the present study, 300 kidney samples of sheep (150) and goats (150) were collected from these abattoirs for determining the patho-morphological changes. Prominent gross lesions in kidney affection included haemorrhage, infarction, hydronephrosis, amyloidosis and nephritis. Histopathological examination revealed massive interstitial haemorrage, MNC's infiltration, atrophy of glomeruli with presence of pinkish amyloid material, hypercellularity of glomeruli and tubular necrosis.

Keywords: Sheep, goats, kidney diseases

Sheep and goats as food animals act as valuable asset of a nation. Mortality of animals from diseases may not be so much significant at a time but their direct effects in terms of decreased milk, meat, wool, hide production, infertility and loss of working capacity in fields and specially zoonotic impact on human health are considerably greater. So, monitoring disease and other conditions at slaughter has been recognized as one way of assessing the disease status of a herd. Every year a significant economic loss occur due to high mortality, poor body weight gain, condemnation of affected edible organs and carcasses of food animals in slaughter houses (Lari, 2007). In this context, data derived from meat inspection at abattoirs is a potential source of information and play important role in epidemiological studies of livestock diseases, public health significance and to estimate the financial losses due to condemnation of affected organs and carcasses (Schweizer *et al*., 2003).

Kidney is an important organ of the body. Excretion is the main function of the kidney. Renal disease is not uncommon in food animals and information resulting from abattoir data is a good source for evaluation and monitoring of renal diseases in livestock (Lari, 2007). Besides economic losses, diseases of sheep and goats might constitute an epidemiologic and zoonotic threat. As such problems concerning meat hygiene and possible health risks to the consumer should be documented during both ante-mortem and post-mortem examination. Affections of kidneys include- developmental anomalies; growth, metabolic and circulatory disturbances; infarction and necrosis; diseases of glomeruli (viral glomerulonephritis, embolic nephritis, immune-mediated glomerulonephritis, immune-complex glomerulonephritis, glomerulosiderosis and glomerulolipidosis); tubulo-interstitial diseases (interstitial nephritis, granulomatous nephritis, pyelonephritis); chronic renal diseases; urolithiasis and various neoplasms (Vegad and Swamy, 2010). Keeping in view the above facts, kidney samples were collected with the objective to study the patho-morphological alterations in infected kidneys of sheep and goats slaughtered in abattoirs of Jammu.

MATERIALS AND METHODS

A cross-sectional study was carried out from July 2013

to June 2014 in order to investigate patho-morphological alterations in kidney diseases of sheep and goats. The study was conducted by collecting 300 kidney samples of sheep (150) and goats (150) from Government recognized and unorganised slaughter houses in and around Jammu. Two areas in and around Jammu division were selected for this study. These areas were Gujjar Nagar, Dogra hall, Bishnah and Nagrota (in Jammu region).

The slaughtered animals were thoroughly examined for gross lesions present over the kidneys, if any. The absolute weights of the kidneys of the slaughtered animals were recorded. The formalin fixed pieces of kidney were processed by paraffin embedding technique. The tissues were properly trimmed, washed in running tap water, dehydrated in graded ethyl alcohol, cleared in xylene and embedded in paraffin wax (melting point 60-62^{o}C). Sections of 4-5 µ thickness were cut using microtome and stained with haematoxylin and eosin (Luna, 1968).

Statistical analysis

The data generated was subjected to one way ANOVA employing Duncan descriptive statistical analysis as per method described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Prevalence of pathological conditions in sheep and goats

Out of total 300 animals, 49 animals i.e. sheep (27) and goats (22) were found to be affected by different pathological conditions. The highest incidence of occurrence of renal infarction was found to be 28.57% followed by nephritis 26.53%, renal haemorrhages 20.40%, renal amyloidosis 14.28% and hydronephrosis 10.20%. Similarly, this corroborated with the findings of earlier workers. Lari (2007) reported nephritis in 3.4%, 0.7% and 0.37% in cattle, sheep and goats, respectively. In cattle and sheep, there was significant decline in prevalence of nephritis and total kidney rejection during the study period while in goats rejection in nephritis was decreased. Jibat *et al.* (2008) reported nephritis as the major pathological lesion accounting for 48.4%. Similarly, Woube (2008) observed nephritis as the principal cause for kidney condemnation in both species. In contrast to this, Mellau *et al.* (2011) reported hydronephrosis as a major cause of kidney condemnation in Arusha abattoir from 2005-2007 followed by cyst, nephritis, infarction, fatty change and melanosis. Nephritis depending on the part involved may be broadly divided into embolic/pyaemicnephritis, pyelonephritis, interstitial nephritis and glomerulonephritis. All of them usually occur from bacterial and viral septicaemias or following ingestion of certain irritants, poisons or toxins (Lari, 2007).

Table 1: Absolute organ weight (Kg) (Mean±S.E) of sheep and goats (N= 25)

Animals/ Kidney disease	Sheep	Goats
Control (Healthy)	0.53±0.22^{a}	0.50±0.10^{a}
Renal haemorrhage	0.85±0.13 ^{a}	0.72±0.16^{a}
Renal infarction	0.40±0.27 ^{a}	0.45±0.47^{a}
Hydronephrosis	1.80±0.20 ^{b}	1.69±0.20 ^{b}
Nephritis	0.92±0.25 ^{a}	0.95±0.30^{a}
Renal amyloidosis	0.54±0.15 ^{a}	0.52±0.80^{a}

Means within row with different superscripts differ significantly (P<0.05)

Patho-morphological conditions

Absolute organ weight

There was a significant increase in the weight of kidney of both sheep and goat in case of hydronephrosis. A non significant increase in weight of kidney was observed in nephritis and renal haemorrhage. While a non significant decrease in the weight of kidney was observed in case of renal infarction as compared with healthy animals. There was a significant increase in the weight of kidneys of both sheep and goat in case of hydronephrosis which might be due to stasis of urine. A non significant increase in weight of kidney was observed in nephritis and renal haemorrhage due to interstitial haemorrhage, Mono nuclear cells (MNC's) infiltration, fibrosis and presence of protein cast (Singh *et al.*, 2013). While a non significant decrease in the weight of kidney was observed in case of renal infarction as compared with healthy animals which might be due to ischaemic necrosis. Very little documented information is available regarding the absolute organ weight of affected kidneys in slaughtered sheep and goats.

Gross and histopathological changes

On gross examination, kidney haemorrhages in sheep and

goats varies from pin point/ petechial to echymotic form. Histopathological examination of kidney showed massive interstitial haemorrhages and MNC infiltration with atrophy of glomeruli. Sastry and Rao (2006) and Jones *et al.* (2006) were also reported similar changes in renal haemorrhage as observed in present study. Ghareib *et al.* (2009) reported renal haemorrhage in kidney infected with *Clostridium perfringes.*

Fig. 1: Renal infarction: Kidney showing pale and wedge shaped infarcts (circle) having apex at the point of obstruction of blood vessel and the base towards the periphery

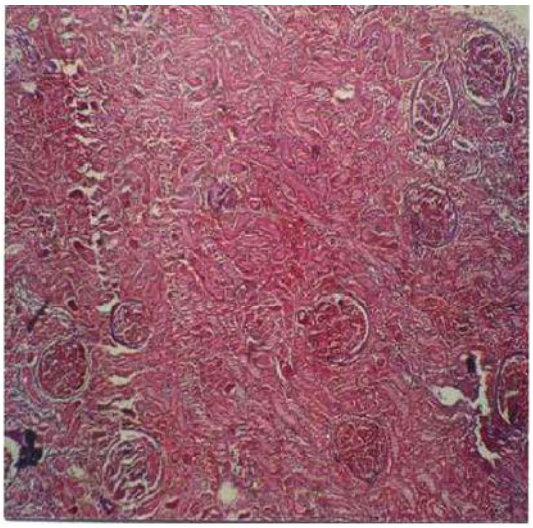

Fig. 2: Renal infarction: Glomeruli and the tubules were discerned through the whole area taking a homogenous pink stain showing coagulative necrosis. H&EX40

Grossly, infarct in the kidney were pale in colour and wedge shaped having apex at the point of obstruction of blood vessel and the base towards the periphery (Fig.1). On histopathological examination, glomeruli and the tubules were discerned through the whole area taking a homogenous pink stain showing coagulative necrosis (Fig.2). Such lesions in kidney were also described by Sastry and Rao (2006) and Jones *et al.* (2006) and opined that infarcts of the kidney were common due to occlusion of branches of renal artery.

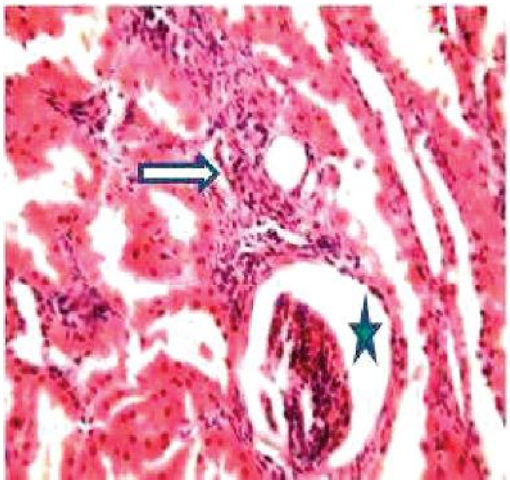

Fig. 3: Hydronephrosis: Kidney showing scattered atrophic glomeruli (star) remain in the thin and fibrous mass with presence of polymorphs and MNC's infiltration (arrow). H&EX400

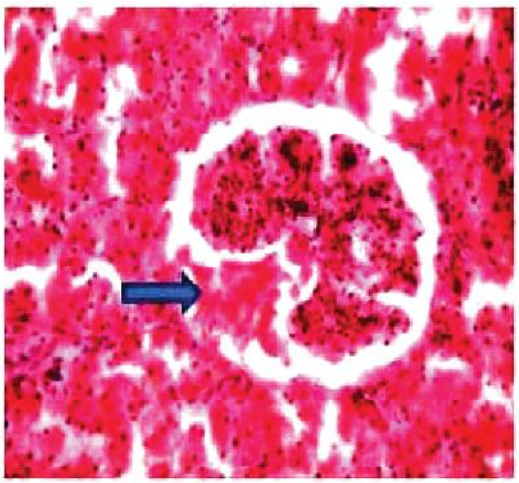

Fig. 4: Renal amyloidosis: Kidney showing presence of pinkish amyloid material in Bowan's space of hypercellular glomeruli (arrow). H&EX400

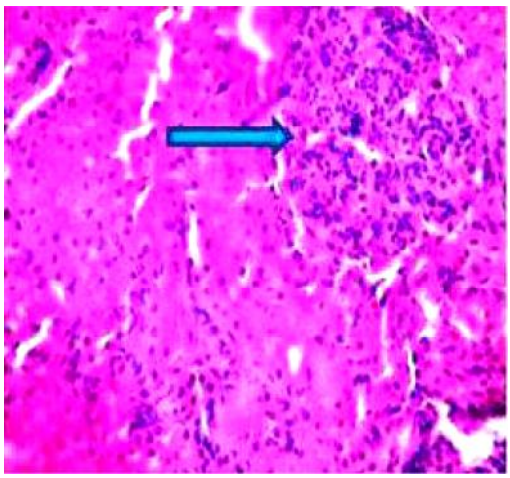

Fig. 5: Glomerulonephritis: Glomerular tuft were increased in size with increased number of endothelial and mesengial cells leading to hypercellularity of glomeruli (arrow). H&EX400

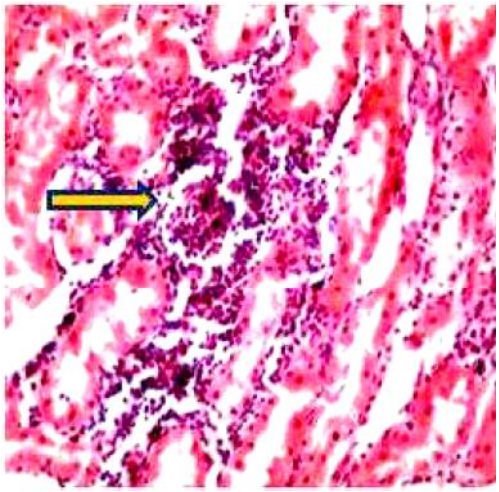

Fig. 6: Interstitial nephritis: Kidney showing presence of lymphocyte and plasma cell infiltration in the interstitium (arrow) with degenerative changes in the PCT. H&EX400

Grossly, there was dilation of renal pelvis and atrophy of renal parenchyma in kidney hydronephrosis. On histopathological examination, scattered atrophic glomeruli remain in the thin and fibrous mass with presence of polymorphs and MNC's infiltration (Fig. 3). This finding is in agreement with findings of Sastry and Rao (2006) and Jones *et al.* (2006). The obstruction produced by the stasis of urine causing its back pressure leading to atrophy of renal parenchyma was the primary cause opined by Sastry and Rao (2006).

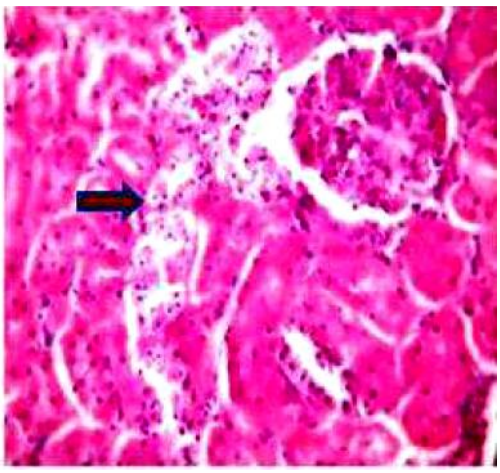

Fig. 7: Acute tubular nephritis: Kidney showing degeneration and necrosis of PCT epithelium with pyknotic nuclei (arrow) and MNC's infiltration. H&EX400

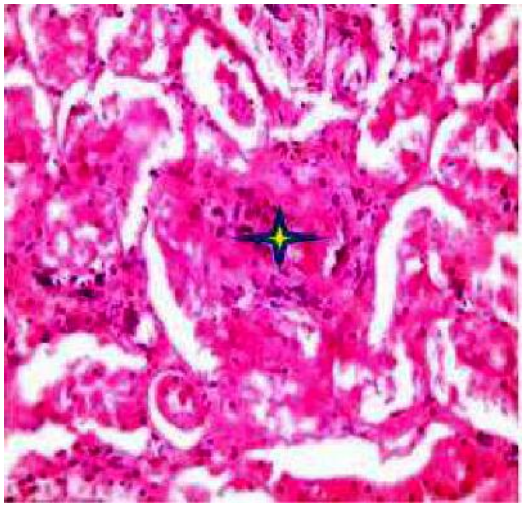

Fig. 8: Glomerulosclerosis: Kidney showing fibrosis of glomerular tuft forming homogenous pinkish mass (star) and narrowing of urinary space. H&EX400

On gross examination, kidneys with amyloid deposited were enlarged and spotty in appearance and bulging on the edges in cut section. Histologically, Kidney showed presence of pinkish amyloid material in Bowann's space of hypercellular glomeruli (Fig. 4). Similarly, Mensua *et al.* (2003) also described the renal amyloidosis in sheep and goats.

Depending upon the part involved the nephritis may be broadly divided into following types:

1. **Glomerulonephritis:** On gross examination, kidneys were enlarged and pale, capsule peel off easily and presence of red dot on the cortex. On microscopic examination, glomerular tuft were increased in size with increased number of endothelial and mesengial cells. Thus, there was increase in glomerular cellularity (Fig.5). This finding corroborated with the findings of Slauson *et al.* (1979); Sastry and Rao (2006) and Jones *et al.* (2006). Sastry and Rao (2006) opined that antigen- antibody reactions to the foreign proteins and as a sequel to bacterial and viral diseases in the body might be responsible for this condition.
2. **Interstitial nephritis:** Grossly, kidneys were slightly enlarged with pale grey colour. Histologically, kidney showed presence of lymphocyte and plasma cell infiltration in the interstitium with degenerative changes in the Proximal convoluted tubules (PCT) (Fig.6). Uzal *et al.* (2002) also conducted a survey on kidney disease in slaughtered food animals and reported interstitial nephritis with MNC's infiltration in intertubular spaces. Among animals this was the most common type of nephritis seen (Sastry and Rao, 2006).
3. **Acute tubular nephritis:** On gross examination, kidneys were slightly enlarged and pale in colour. On microscopic examination, kidney showed degeneration and necrosis of PCT epithelium with pyknotic nuclei (Fig.7). Sastry and Rao (2006) and Jones *et al.* (2006) also described degenerative and necrotic changes in PCT epithelium infected with tubular nephritis. Various irritant toxic substances acted directly to produce fatty changes and necrosis of delicate epithelial cells lining the tubules (Jones *et al.*, 2006). Sastry and Rao (2006) opined that highly functional and specialised epithelium of PCT is greatly susceptible to the irritant.

Grossly, glomerulosclerotic kidneys were enlarged, fibrosed, pale gray in colour, hard and cut with difficulty. On microscopic examination, kidney showed fibrosis of glomerular tuft forming homogenous pinkish mass and narrowing of urinary space (Fig. 8). Sastry and Rao (2006) and Jones *et al.* (2006) along with these changes also reported periglomerular fibrosis.

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